

IN THE CLAIMS:

Please amend the claims as follows:

Claim 1 (Previously Presented): An electron-emitting device comprising:

an electron source layer made of one of a metal, a metal alloy and a semiconductor;

an insulating layer formed on said electron source layer, said insulating layer having at least one island region serving as an electron-emitting section in which film thickness of said insulating layer is reduced;

a carbon region made of one of carbon and a carbon compound provided on at least one of bottom and inside of said island region, the carbon region being disposed having a vacuum space directly over the carbon region; and

a metal thin film electrode formed on said insulating layer,

wherein the electron source layer directly interfaces the carbon region at a center of the island region with the electron source layer facing the vacuum space via the carbon region at the center of the island region,

wherein electrons are emitted upon application of an electric field between said electron source layer and said metal thin film electrode.

Claim 2 (Original): An electron-emitting device as claimed in claim 1 wherein said metal thin film electrode and said carbon region are deposited by one of a physical deposition method and a chemical deposition method.

Claim 3 (Original): An electron-emitting device as claimed in claim 1 wherein said carbon region is a thin film deposited on one of said island region and said metal thin film electrode.

Claim 4 (Original): An electron-emitting device as claimed in claim 1 wherein said carbon region is a thin film deposited on said island region while a voltage is being applied between said electron source layer and said metal thin film electrode.

Claim 5 (Original): An electron-emitting device as claimed in claim 4 wherein said applied voltage is supplied intermittently according to a voltage application period in which the voltage rises and falls.

Claim 6 (Canceled).

Claim 7 (Original): An electron-emitting device as claimed in claim 1 wherein said carbon region is a thin film deposited under said metal thin film electrode.

Claim 8 (Withdrawn): An electron-emitting device as claimed in claim 1 wherein said carbon region is a thin film deposited under said insulating layer.

Claim 9 (Original): An electron-emitting device as claimed in claim 1 wherein the thickness of said metal thin film is gradually reduced in conjunction with said insulating layer.

Claim 10 (Original): An electron-emitting device as claimed in claim 1 wherein the thickness of said carbon region is gradually reduced in conjunction with said insulating layer.

Claim 11 (Original): An electron-emitting device as claimed in claim 1 wherein said insulating layer is made of a dielectric material and has a thickness of at least 50 nm in areas other than said island region.

Claim 12 (Previously Presented): An electron-emitting device as claimed in claim 1 wherein said metal thin film electrode terminates on said insulating layer in a manner such that a thickness thereof is gradually reduced within said island region.

Claim 13 (Original): An electron-emitting device as claimed in claim 1 wherein said insulating layer terminates on said electron source layer within said island region.

Claim 14 (Original): An electron-emitting device as claimed in claim 1 wherein said island region is a recess on a flat surface of said metal thin film electrode and said insulating layer.

Claim 15 (Withdrawn): An electron-emitting device as claimed in claim 1 further comprising a fine particle within said island region.

Claim 16 (Withdrawn): An electron-emitting device as claimed in claim 1 further comprising, within said island region, a reverse-tapered block projecting in a direction normal to said substrate and at a top portion thereof, includes an overhang projecting in a direction parallel to said substrate.

Claims 17-29 (Canceled).

Claim 30 (Previously Presented): A display apparatus comprising;

a first substrate and a second substrate facing each other with a vacuum space therebetween;

a plurality of electron-emitting devices provided on said first substrate;

a collector electrode provided on an interior surface of said second substrate; and

a phosphor layer formed on said collector electrode; wherein each of said electron-emitting devices comprises

an electron source layer made of one of a metal, a metal alloy and a semiconductor formed on an ohmic electrode,

an insulating layer formed on said electron source layer and having at least one island region serving as an electron-emitting section in which film thickness of said insulating layer is reduced,

a metal thin film electrode formed on said insulating layer, and

a carbon region made of one of carbon and a carbon compound is provided on at least one of a bottom and inside of said island region, the carbon region being disposed having a vacuum space directly over the carbon region,

wherein the electron source layer directly interfaces the carbon region at a center of the island region with the electron source layer facing the vacuum space via the carbon region at the center of the island region.

Claim 31 (Original): A display apparatus as claimed in claim 30 wherein said insulating layer, said metal thin film electrode and said carbon region are deposited by one of a physical deposition method and a chemical deposition method.

Claim 32 (Original): A display apparatus as claimed in claim 30 wherein said carbon region is a thin film deposited on one of said island region and said metal thin film electrode.

Claim 33 (Original): A display apparatus as claimed in claim 30 wherein said carbon region is a thin film deposited on said island region while a voltage is being applied between said electron source layer and said metal thin film electrode.

Claim 34 (Original): A display apparatus as claimed in claim 30 wherein said applied voltage is supplied intermittently according to a voltage application period in which the voltage rises and falls.

Claim 35 (Canceled).

Claim 36 (Original): A display apparatus as claimed in claim 30 wherein said carbon region is a thin film deposited under said metal thin film electrode.

Claim 37 (Withdrawn): A display apparatus as claimed in claim 30 wherein said carbon region is a thin film deposited under said insulating layer.

Claim 38 (Original): A display apparatus as claimed in claim 30 wherein the thickness of said metal thin film electrode is gradually reduced in conjunction with said insulating layer.

Claim 39 (Previously Presented): A display apparatus as claimed in claim 30 wherein the thickness of said carbon region is gradually reduced in conjunction with said insulating layer.

Claim 40 (Original): A display apparatus as claimed in claim 30 wherein said insulating layer is made of a dielectric material and has a film thickness of at least 50 nm in areas other than said island region.

Claim 41 (Previously Presented): A display apparatus as claimed in claim 30 wherein said metal thin film electrode terminates on said insulating layer in a manner such that a thickness thereof is gradually reduced within said island region.

Claim 42 (Original): A display apparatus as claimed in claim 30 wherein said insulating layer terminates on said electron source layer within said island region.

Claim 43 (Original): A display apparatus as claimed in claim 30 wherein said island region is a recess on a flat surface of said metal thin film electrode and said insulating layer.

Claim 44 (Withdrawn): A display apparatus as claimed in claim 30 further comprising a fine particle within said island region.

Claim 45 (Withdrawn): A display apparatus as claimed in claim 30 further comprising, within said island region, a reverse-tapered block which projects outwardly in a direction normal to said substrate and has an overhang in a top portion thereof, projecting in a direction parallel to said substrate.

Claim 46 (Withdrawn): A display apparatus as claimed in claim 30 wherein bus lines are formed over a plurality of said metal thin film electrodes, and said ohmic electrodes and said bus lines are electrodes, each having a shape of a strip, and arranged orthogonal to each other.

Claim 47 (Previously Presented): An electron-emitting device as claimed in claim 1, wherein said island region defines a curved concave recess, the entire concave recess being semi-spherical in shape.

Claim 48 (Previously Presented): An electron-emitting device as claimed in claim 1, wherein film thickness of said insulating layer is gradually reduced and at least one of said carbon region and said metal thin film electrode has a film thickness that is gradually reduced to a thickness of zero in the island region.

Claim 49 (Previously Presented): A display as claimed in claim 30, wherein said island region defines a curved concave recess, the entire concave recess being semi-spherical in shape.

Claim 50 (Previously Presented): A display as claimed in claim 30, wherein film thickness of said insulating layer is gradually reduced and at least one of said carbon region and said metal thin film electrode has a film thickness that is gradually reduced to a thickness of zero in the island region.

Claims 51-52 (Canceled).